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STATE OF CALIFORNIA

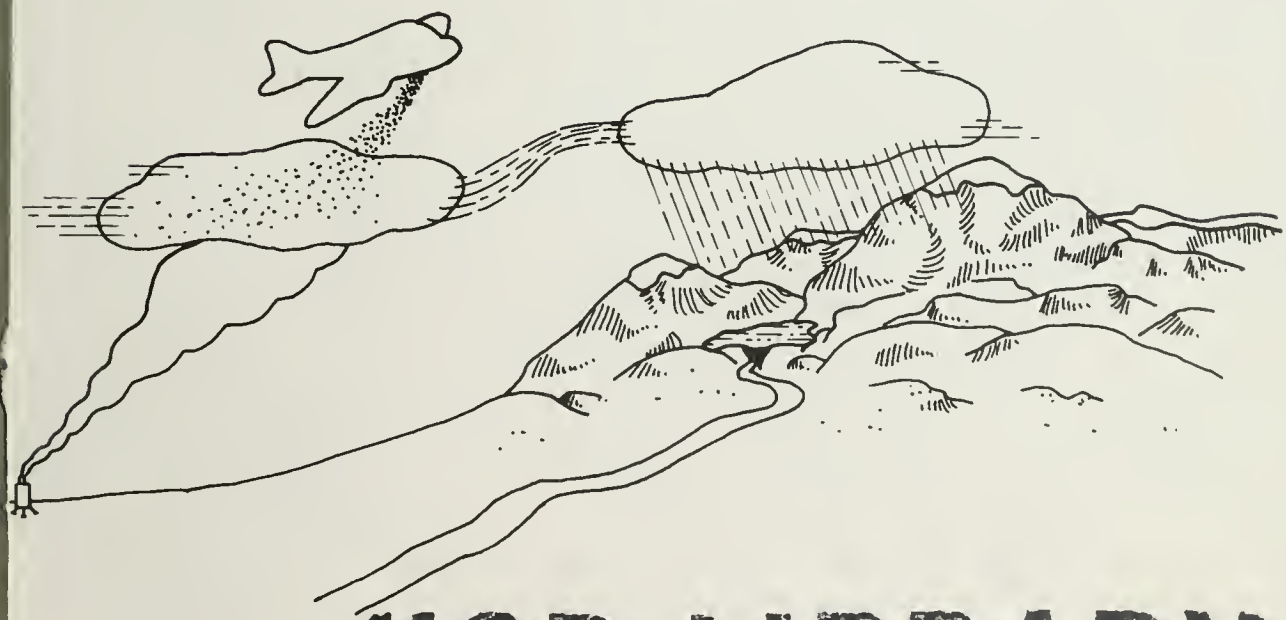
The Resources Agency

Department of Water Resources

Division of Planning

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA

October 1, 1972 — September 30, 1973



JULY 1975

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Publication of a detailed annual summary of weather modification operations in California will be discontinued with this report. Future reports on this subject, to be issued each year, will will be limited to showing the locations of weather modification projects and listing agencies and operators involved in the projects. Copies of these summaries will be available from:

Department of Water Resources
State of California
P. O. Box 388
Sacramento, CA 95802

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WEATHER MODIFICATION OPERATIONS IN CALIFORNIA

October 1, 1972 — September 30, 1973

JULY 1975

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Seeded cloud as it appears 10 minutes after having been treated with silver iodide dispersed from an airplane. Rain is falling beneath the treated portion of the cloud (blurred area at the left). Unseeded portion on the right shows no evidence of precipitation.

Photo by Atmospherics Incorporated, Fresno, California

STATE OF CALIFORNIA

THE RESOURCES AGENCY

DEPARTMENT OF WATER RESOURCES

DIVISION OF PLANNING

Herbert W. Greydanus ..... Division Chief
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FOREWORD

Chapter 4 of the California Water Code, which governs the regulation of rain-making and rain-prevention, declares that the State shall encourage scientific efforts to develop, increase, and regulate the precipitation of rain and snow in California. Regulation and control of artificial means of interfering with natural precipitation are, by statute, the responsibility of the Department of Water Resources. Persons undertaking such work must be licensed by the Department and, upon completion of their operations, must report the manner and extent of their efforts to the Department.

This report describes weather modification efforts carried out in California from October 1, 1972, through September 30, 1973. Nine licensees engaged in 11 projects, the target areas of which are shown in Plate 1. All projects made use of silver iodide in various forms as the active agent to increase precipitation. Three projects used both ground-based and airborne generators, and eight used ground-based generators only.

No information is available from which the Department is able to assess the results of these operations.

Excerpts from the California Water Code that pertain to the administration of weather modification projects in the State appear on pages 6 and 7.

Herbert W. Greydanus, Chief
Division of Planning
Department of Water Resources
The Resources Agency
State of California

EXCERPTS FROM THE CALIFORNIA WATER CODE

CHAPTER 4. REGULATION OF RAIN-MAKING AND RAIN-PREVENTION

(Chapter 4 added by Statutes of 1953, Chapter 139, as part of codification)

400. The public interest, health, safety, welfare, and necessity require that scientific experimentation in the field of artificial nucleation, and that scientific efforts to develop, increase, and regulate natural precipitation be encouraged, and that means be provided for the regulation and control of the interference by artificial means with natural precipitation of rain, snow, moisture, or water in any form contained in the atmosphere, within the State, in order to develop, conserve, and protect the natural water resources of the State and to safeguard life and property.

401. As used in this chapter:

(a) "Department" means the Department of Water Resources.

(b) "Person" means any person, firm, association, organization, partnership, company, corporation, private or public, county, city, city and county, district, or other public agency.

(As amended by Stats. 1959, Ch. 1269)

402. No person, without first securing a license from the department, shall cause or attempt to cause condensation or precipitation of rain, snow, moisture, or water in any form contained in the atmosphere, or shall prevent or attempt or prevent by artificial means the natural condensation or precipitation of rain, snow, moisture, or water in any form contained in the atmosphere.

403. Any person desiring to do any of the acts specified in Section 402 may file with the department an application in writing for a license. Each application shall be accompanied by a filing fee fixed by the department with the approval of the Department of General Services but not to exceed fifty dollars ($50) and shall be on a form to be supplied for such purpose by the department.

(As amended by Stats. 1965, Ch. 371)

404. Every application shall set forth all of the following:

(a) The name and post-office address of the applicant.

(b) The previous education, experience, and qualifications of the applicant, or, if the applicant is other than an individual, the previous education, experience, and qualifications of the persons who will be in control of and charged with the operations of the applicant.

(c) A general description of the operations which the applicant intends to conduct and the method and type of equipment that the applicant proposes to use.

(d) Such other pertinent information as the department may require.

405. Upon the filing of the application upon a form supplied by the department and containing the information prescribed by this chapter and accompanied by the required filing fee the department shall issue a license to the applicant entitling the applicant to conduct the operations described in the application for the calendar year for which the license is issued, unless the license is sooner revoked or suspended.

406. A license may be renewed annually upon application to the department, accompanied by a renewal fee fixed by the department with the approval of the Department of General Services but not to exceed twenty-five dollars ($25), on or before the last day of January of the calendar year for which the license is renewed.

(As amended by Stats. 1965, Ch. 371)

407. Prior to undertaking any operation authorized by the license the licensee shall file with the department and cause to be published a notice of intention. The licensee shall then confine his activities for that operation substantially within the time and area limits set forth in the notice of intention.

408. The notice of intention shall set forth all of the following

(a) The name and address of the licensee.

(b) The nature and object of the intended operation and the person or persons on whose behalf it is to be conducted.

(c) The area in which and the approximate time during which the operation will be conducted.

(d) The area which will be affected by the operation as near as the same may be determined in advance.

409. The licensee shall cause the notice of intention to be published pursuant to Section 6063 of the Government Code in a newspaper having a general circulation and published within any county wherein the operation is to be conducted and in which the affected area is located, or, if the operation is to be conducted in more than one county or if the affected area is located in more than one county or is located in a county other than the one in which the operation is to be conducted, then such notice shall be published in like manner in a newspaper having a general circulation and published within each of such counties. In case there is no newspaper published within the appropriate county, publication shall be made in a newspaper having a general circulation within the county.

(As amended by Stats. 1955, Ch. 482, and by Stats. 1957, Ch. 448)

410. Proof of publication shall be filed by the licensee with the department within 15 days from the date of the last publication of the notice. Proof of publication shall be by copy of the notice as published attached to and made a part of the affidavit of the publisher or foreman of the newspaper publishing the notice.

411. Every licensee shall keep and maintain a record of all operations conducted by him pursuant to his license showing the method employed, the type of equipment used, the times and places of operation of the equipment, the name and post-office address of each person participating or assisting in the operation other than the licensee, and such other information as may be required by the department, and shall report the same to the department immediately upon the completion of each operation.

412. Each licensee shall further prepare and maintain an evaluation statement for each operation which shall include a report as to estimated precipitation, defining the gain or loss occurring from nucleation activities, together with supporting data therefor. This statement, together with such other pertinent information as the department may require, shall be sent to the department upon request by the department.

413. Notwithstanding any provision of this chapter to the contrary, the department may grant a licensee permission to undertake an emergency nucleation project, without compliance by the licensee with the provisions of Sections 407 to 410, inclusive, if the same appears to the department to be necessary or desirable in aid of extinguishment of fires.

413.5 Notwithstanding any provision of this chapter to the contrary, upon request of the board of supervisors of a county or of the governing body of a city or a public district of the State, and upon the submission of such supporting evidence as the department may require, the department may grant a licensee permission to undertake a nucleation project for the purpose of alleviating a drought emergency, without prior compliance by the licensee with the provisions of Section 407 requiring publication of notice of intention, if such project appears to the department to be necessary or desirable. Nothing contained in this section shall be construed as to relieve the licensee in such case from compliance with the provisions of Sections 407 to 410, inclusive, requiring publication of notice of intention and filing of proof of such publication, as soon after the granting of permission by the department as is practicable.

(Added by Stats. 1955, Ch. 1399)

414. Any license may be revoked or suspended if the department finds, after due notice to the licensee and a hearing thereon, that the licensee has failed or refused to comply with any provisions of this chapter. The proceedings herein referred to shall be conducted in accordance with the provisions of the Administrative Procedure Act, Chapter 5, Part 1, Division 3, Title 2 of the Government Code and the department shall have all the powers granted therein.

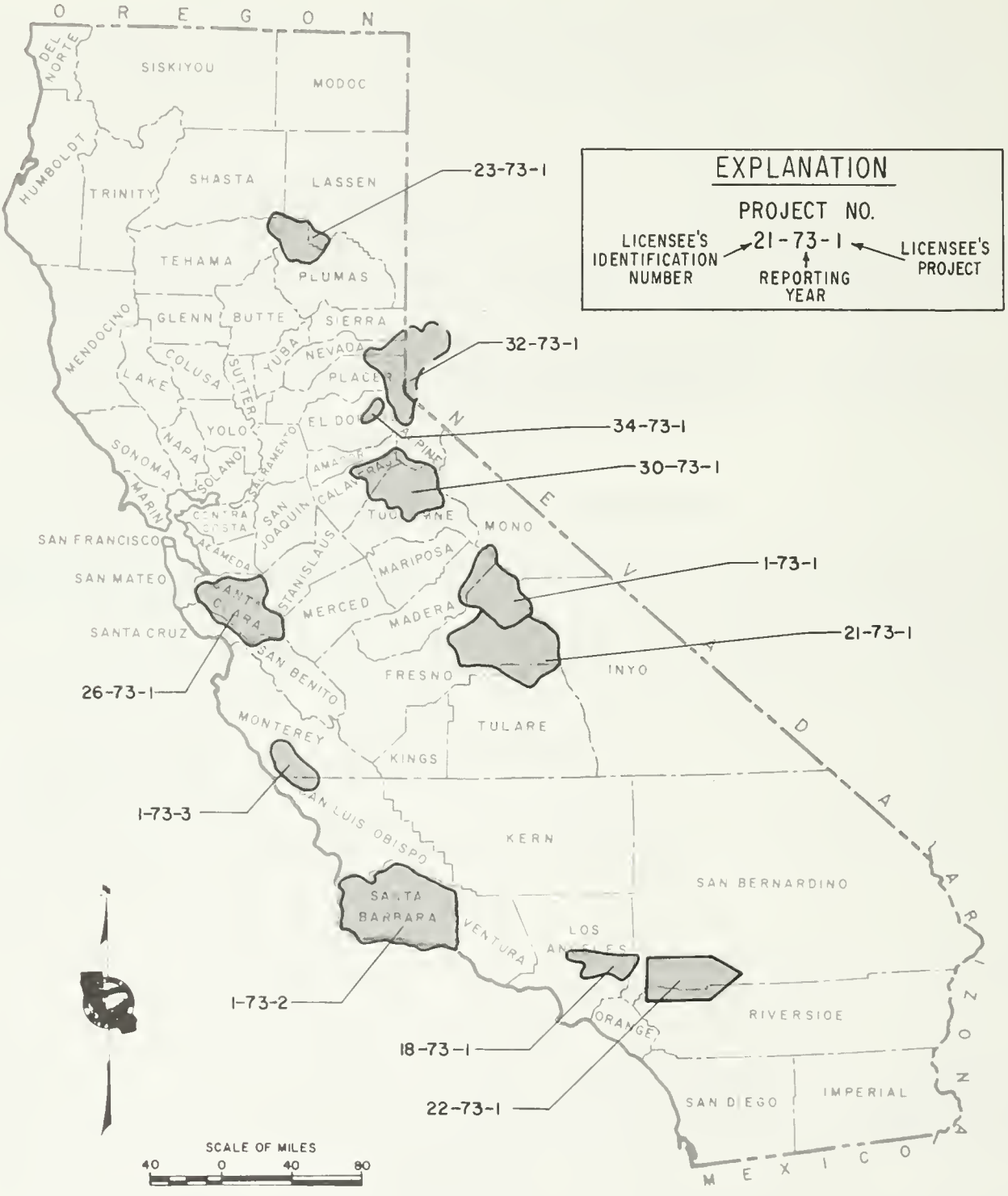
415. Any person who violates any provision of this chapter is guilty of a misdemeanor.

SECTION 6063 OF THE GOVERNMENT CODE

6063. Publication of notice pursuant to this section shall be once a week for three successive weeks. Three publications in a newspaper regularly published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the twenty-first day, including therein the first day.

(Added by Stats. 1949, Ch. 1587; as amended by Stats. 1957, Ch. 1670, and by Stats. 1959, Ch. 954)

PLATE I. WEATHER MODIFICATION TARGET AREAS



WEATHER MODIFICATION PROJECTS IN CALIFORNIA 1973 WATER YEAR

PROJECT NO.	LICENSE NO.	LICENSEE	CLIENT
1-73-1	1	North American Weather Consultants Santa Barbara Municipal Airport Goleta, California 93017	Southern California Edison Company
1-73-2	1	North American Weather Consultants	U. S. Naval Weapons Center, China Lake
1-73-3	1	North American Weather Consultants	Monterey County Flood Control and Water Conservation District
	5	Water Resources Development Corporation Weather Modification Projects 611 South Palm Canyon Drive Suite 216 Palm Springs, California 92262	Licensee Inactive This Water Year
	12	Precipitation Control Company of California 105 Pierce Street Taft, California 93268	Licensee Inactive This Water Year
18-73-1	18	Los Angeles County, Flood Control District P. O. Box 2418, Terminal Annex Los Angeles, California 90054	Los Angeles County Flood Control District
21-73-1	21	Atmospherics, Incorporated 5652 E. Dayton Avenue Fresno, California 93727	Kings River Conservation District
22-73-1'	22	San Bernardino Valley Municipal Water District 1350 South E Street P. O. Box 5906 San Bernardino, California 92408	San Bernardino Valley Municipal Water District
23-73-1	23	Pacific Gas and Electric Company 245 Market Street San Francisco, California 94106	Pacific Gas and Electric Company
	25	K.R.C. Service Corporation 2956 C Street San Diego, California 92102	Licensee Inactive This Water Year
26-73-1	26	Santa Clara County Flood Control and Water District 15420 Alamaden Expressway San Jose, California 95118	Santa Clara County Flood Control and Water District
	29	World Weather, Incorporated P. O. Box 22250 Sacramento, California 95822	Licensee Inactive This Water Year
30-73-1	30	Fresno State College Foundation Atmospheric Water Resources Research 4831 East Shields Avenue Fresno, California 93726	Fresno State College Foundation, Atmospheric Water Resources Research
32-73-1	32	Desert Research Institute University of Nevada System Stead Facility Reno, Nevada 89507	Division of Atmospheric Water Resources Management, U.S.
34-73-1	34	Sacramento Municipal Utility District P. O. Box 15830 Sacramento, California 95813	Sacramento Municipal Utility District
	36	Wem-Car, Incorporated 390 Grand Avenue Oakland, California 95610	Licensee Inactive This Water Year
	39	World Wide Weather Inc. 1861 Watt Avenue Sacramento, California 95825	Licensee Inactive This Water Year

Project 1-73-1

UPPER SAN JOAQUIN RIVER BASIN

LICENSEE: North American Weather Consultants

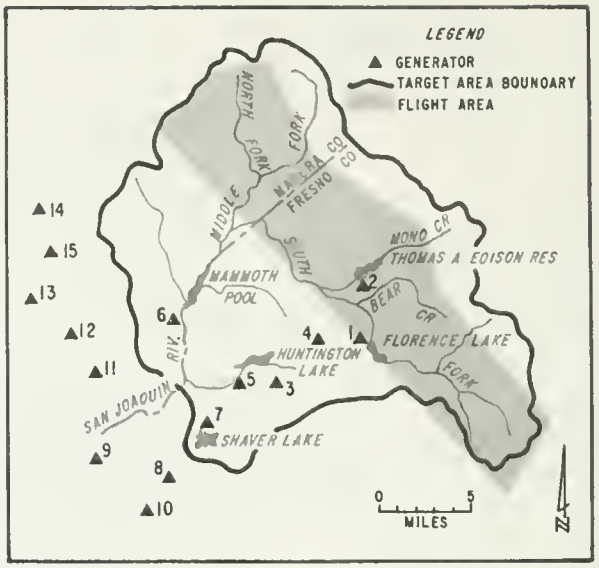
CLIENT: Southern California Edison Company

TARGET AREA: Drainage area of the Upper San Joaquin River and tributary streams above Southern California Edison Power House No. 3

PURPOSE: By increasing snowfall, to increase water stored behind reservoirs used for generation of electrical power.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators burning solution of silver iodide and ammonium iodide in acetone and aircraft seeding using pyrotechnics that disperse silver iodide smoke when burned.



Generators No.	Location	Elev.	Hours of Operation 1972 Oct.	Nov.	Dec.	1973 Jan.	Feb.	Mar.	Apr.	Aug.	Sep.	Total
1	Florence	7450	49:15	69:45	28:00	77:15	224:15	136:00	42:00	0	0	626:30
2	Vermilion	7475	52:00	94:30	95:15	113:00	221:00	135:00	39:15	0	0	750:00
3	China Peak	8600	0	72:30	78:16	117:00	208:00	120:30	37:00	0	0	633:15
4	Mt. Given	9760	69:15	91:30	96:30	123:15	221:00	171:30	42:00	0	0	815:00
5	Huntington	7000	53:00	76:30	74:15	111:00	208:00	124:30	26:30	0	0	673:45
6	Mammoth Pool	3200	71:15	143:30	56:00	96:30	208:00	177:30	15:30	0	0	768:15
7	Shaver	5400	55:15	62:30	36:15	109:45	188:00	93:45	11:00	0	0	556:30
8	Pine Ridge	4080	4:00	72:45	0	58:00	148:30	76:30	0	0	0	359:45
9	Auberry	2800	4:00	83:30	0	76:00	145:30	78:30	8:30	0	0	396:00
10	Toll House	1920	4:00	70:00	0	75:30	137:00	68:30	8:30	0	0	363:30
11	South Fork	2640	0	96:30	0	54:30	86:30	89:15	9:00	0	0	335:45
12	Bass Lake	3000	4:00	59:30	23:30	57:30	104:45	98:45	9:00	0	0	357:00
13	Oakhurst	2700	0	0	0	0	0	34:30	0	0	0	34:30
14	Fish Camp	5100	0	0	0	0	0	49:00	0	0	0	49:00
15	Cedar Valley	3500	0	0	0	0	0	49:15	0	0	0	49:15
	Subtotal		**366:00**	**993:00**	**488:00**	**1069:15**	**2100:30**	**1503:00**	**248:15**	**0**	**0**	**6768:00**
	Manual Pyrotechnic			4:40	1:20		16:24	15:36				38:00
	Aircraft Generation		0	0	0	0	0	0	0	17:23	1:30	18:26
	Total Hours		**366:00**	**997:40**	**489:20**	**1069:15**	**2116:54**	**1518:36**	**248:15**	**17:23**	**1:03**	**6824:26**
	No. of storms seeded		6	3	5	6	4	7	2	4	1	38
	No. of days seeded		10	11	8	14	15	17	5	10	1	91
	AgI, Aircraft & Ground (Grams)		2196.0	6588.0	3108.0	6415.5	14817.0	11124.0	1489.5	2134.0	126.0	47,998.0

Project 1-73-2

SANTA BARBARA COUNTY

LICENSEE: North American Weather Consultants

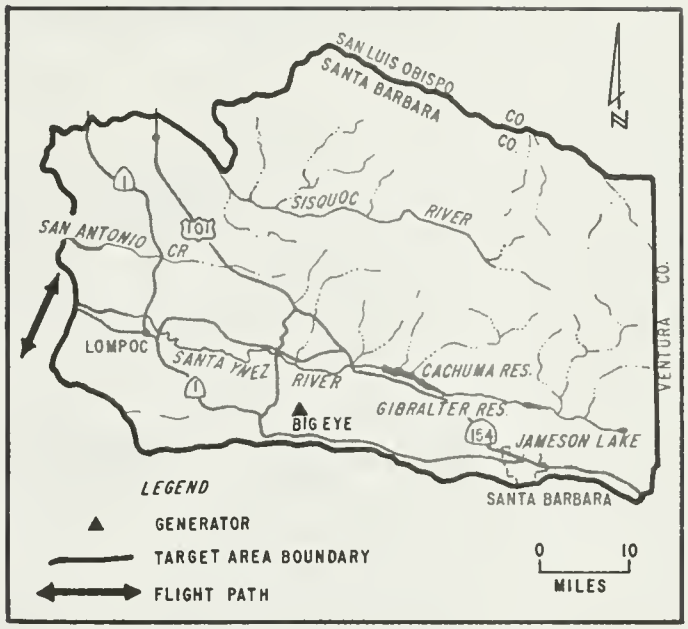
CLIENT: Naval Weapons Center, China Lake

TARGET AREA: Santa Barbara County

PURPOSE: To test operations for modifying precipitation in precipitation bands.

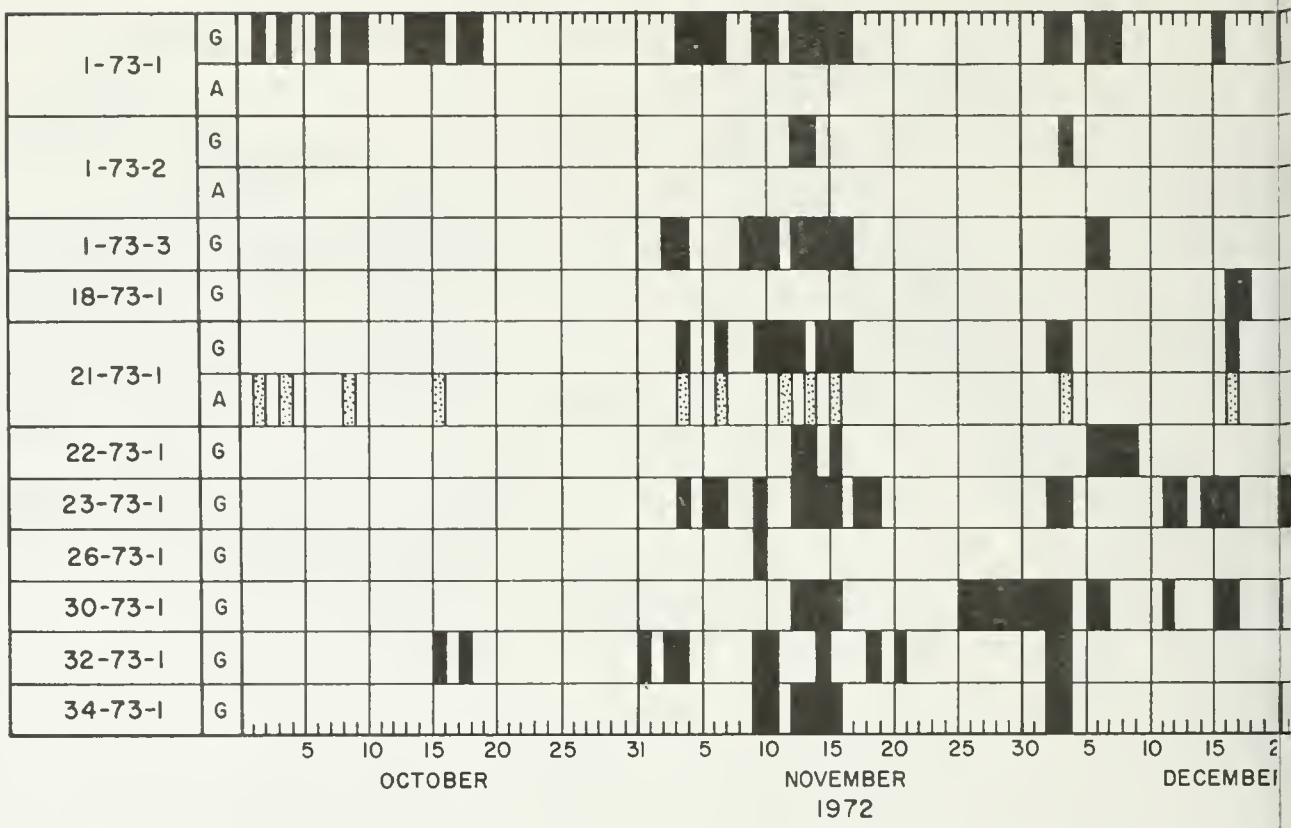
ACTIVE AGENT: Silver iodide (AgI)

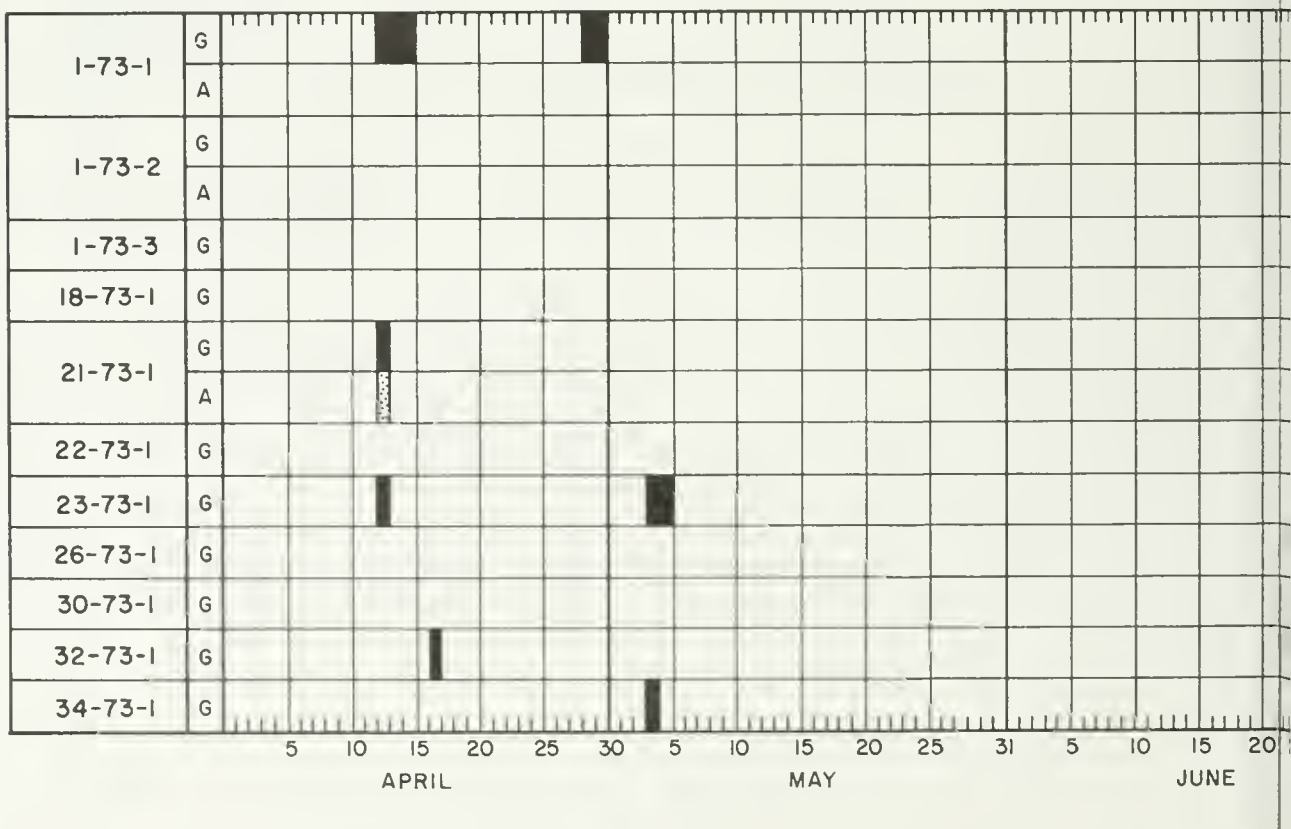
DISPERSAL METHOD: Ground-based and aircraft generators burning a solution of silver iodide and ammonium iodide in acetone.



Generator Location	Elev.	Hours of Operation 1972 Nov.	Dec.	1973 Jan.	Feb.	Mar.	Total
Big Eye	3450	4:45	4:50	3:26	14:04	0	27:05
Aircraft		0	0	3:02	00:17	3:36	6:55
Total Hours		**4:45**	**4:50**	**6:28**	**14:21**	**3:36**	**34:00**
No. Storms		1	1	2	4	2	10
No. Days Seeded		2	1	2	5	2	12
AgI Used (grams)		1653.0	1682.0	3324.2	5399.2	2527.2	14,585.6
Rate of Dispersal (Grams per minute)							
Ground-Generator 5.8 grams per minute							
Aircraft Jan. 11.7 grams per minute							
Feb. 29.3 grams per minute							
Mar. 11.7 grams per minute							

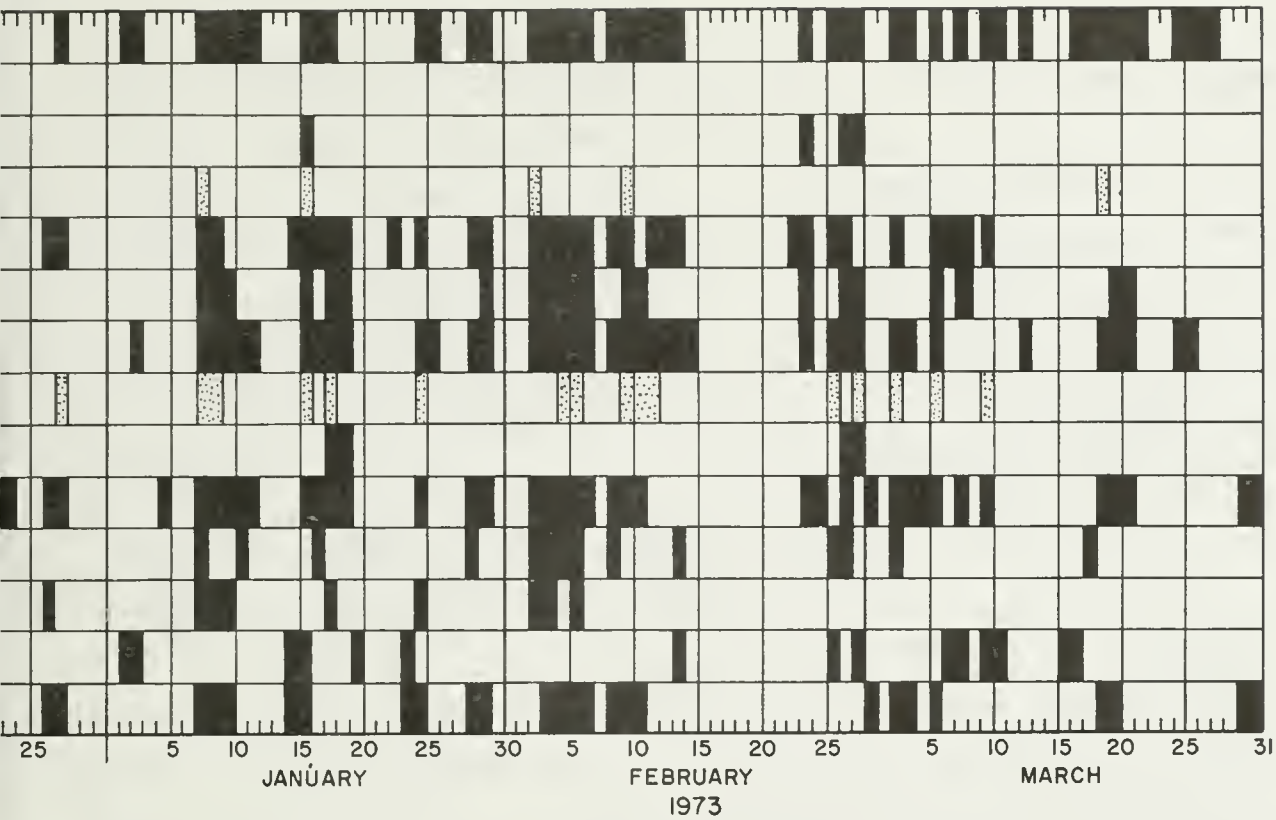
CLOUD SEEDING OPERATIONS

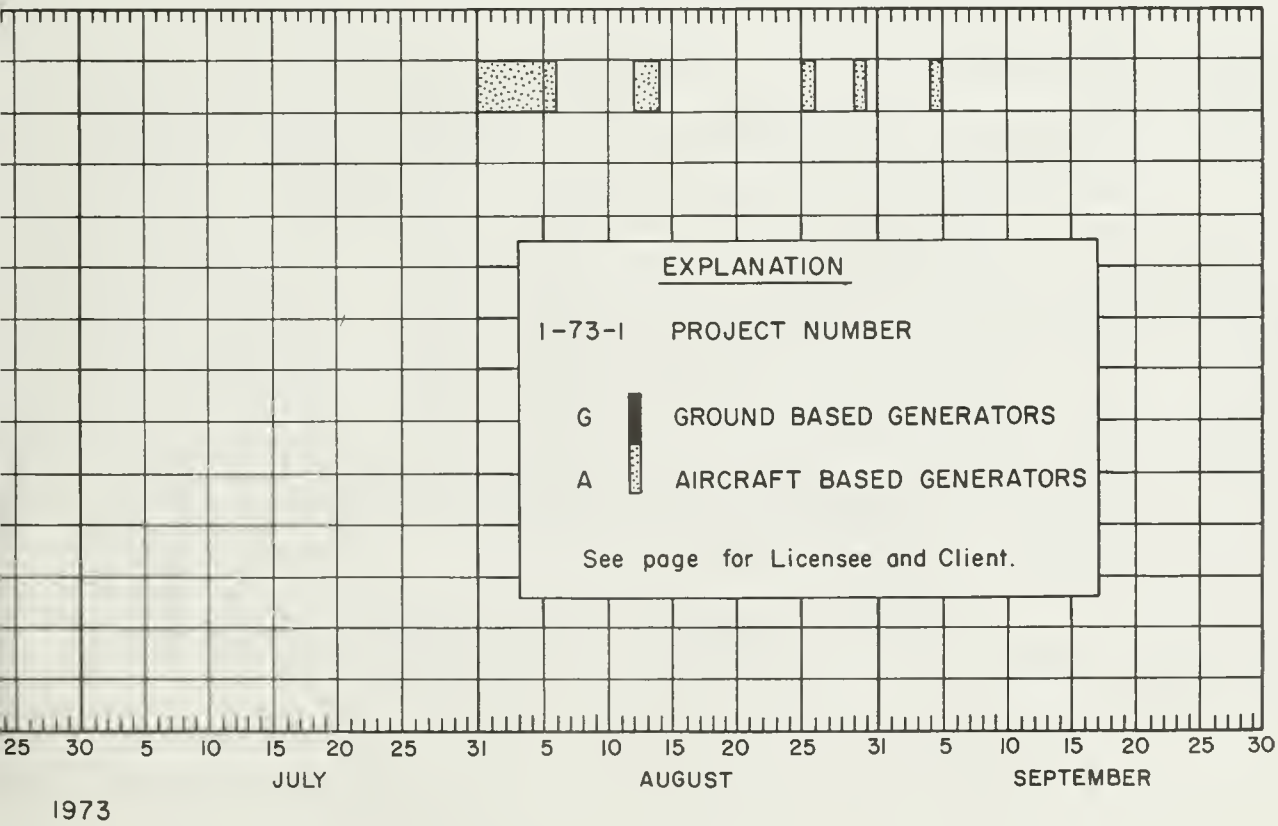




- WATER YEAR 1972-1973

PLATE 2





Project 1-73-3

MONTEREY COUNTY PROJECT

LICENSEE: North American Weather Consultants

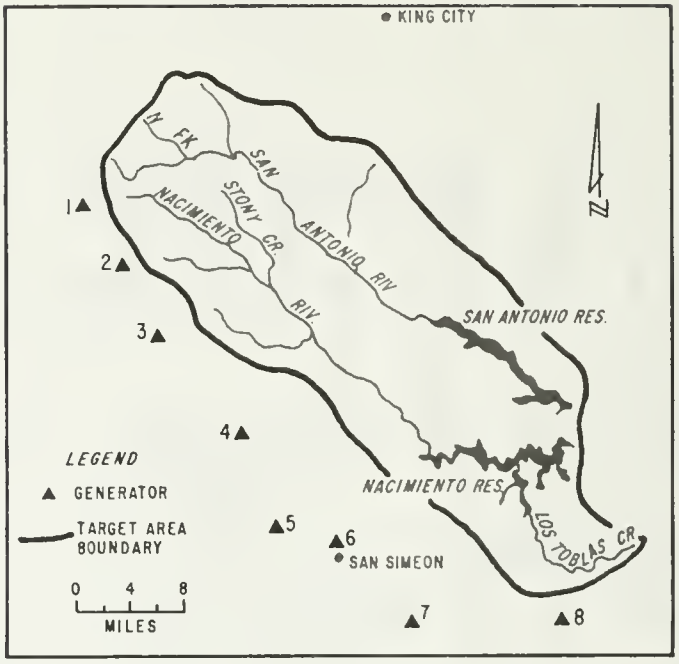
CLIENT: Monterey County Flood Control and Water Conservation District

TARGET AREA: Drainage basins above Nacimiento and San Antonio Reservoirs

PURPOSE: To increase water supply behind reservoirs by increasing precipitation.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators burning a solution of silver iodide and ammonium iodide in acetone.



Generator			Hours of Operation					
			1972		1973			
No.	Location	Elev.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
1	Lucia	200	0	0	4:30	0	12:15	16:45
2	Pacific Valley	200	96:15	44:45	73:45	139:30	38:00	392:15
3	Gorda	200	27:00	44:45	87:45	106:45	37:15	303:30
4	Ragged Point	200	65:30	43:00	45:30	126:30	20:15	300:45
5	Piedras Blancas	200	91:30	32:00	52:30	80:45	28:00	284:45
6	San Simeon	200	102:15	44:45	69:00	120:15	27:45	364:00
7	Cambria	200	96:45	0	164:15	124:30	20:30	406:00
8	Cambria, 10E	1500	50:15	0	26:30	98:30	0	175:15
	Total		**529:30**	**209:15**	**523:45**	**796:45**	**184:00**	**2243:15**
Number of Storms			4	2	5	7	4	22
Days Seeded			10	4	11	14	5	44
AgI Used (grams)			3177.0	1255.5	3142.5	4780.5	1104.0	13459.5
Rate of dispersal (grams per hour per generator)			6	6	6	6	6	

Project 18-73-1

SAN GABRIEL MOUNTAINS

LICENSEE: Los Angeles County Flood Control District

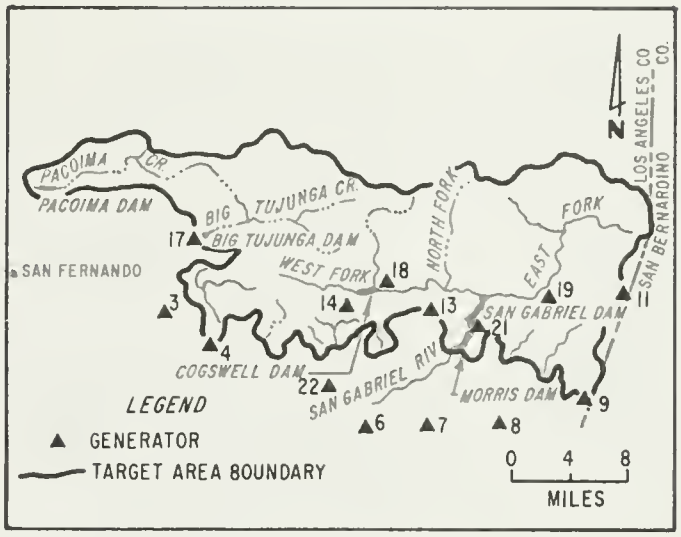
CLIENT: Same

TARGET AREA: Southern slopes of the San Gabriel River, Big Tujunga Creek, and Pacoima Creek drainage basins tributary to the district's reservoirs.

PURPOSE: To increase water supply behind reservoirs by increasing precipitation.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators using a solution of silver iodide and ammonium iodide in acetone.



Generator No.	Location	Elev.	1972 Dec.	Hours of Operation 1973 Jan.	Feb.	Mar.	Total
3	Pickens Patrol Station	1600	0	28:30	37:00	2:15	67:45
4	Devil's Gate Dam	1090	0	37:25	36:50	6:25	80:40
6	Longden Yard	356	0	14:25	49:05	8:45	72:15
7	Ben Lomond S.G.	350±	0	14:35	37:45	5:52	58:12
8	Puddingstone Dam	800	0	8:18	49:00	7:18	64;36
9	Thompson Creek Dam	1800	0	8:38	34:40	0	43:18
11	Mt. Baldy Guard Station	4275	0	20:35	24:00	4:45	49:20
13	Pine Mountain	4100	0	60:09	85:19	0	145:28
14	Spring Camp	4655	0	35:32	18:53	20:18	74:43
17	Big Tujunga Dam	2315	10:19	58:25	19:15	13:38	101:37
18	Cogswell Dam	2300	10:05	59:25	104:10	21:30	195:10
19	East Fork Ranger Station	2075	0	7:20	79:15	8:48	95:23
21	San Gabriel Dam	1350	0	48:40	102:35	8:00	159:15
22	Eaton Wash Dam	650	0	26:32	68:40	10:17	105:29
	Total Hours		**20:24**	**428:29**	**746:27**	**117:51**	**1313:11**
	Number of days seeded		2	7	10	4	23
	AgI Used (grams) Rate of dispersal - 6 grams per hour		122.4	2571.0	4479.0	708.6	7881.0

Project 21-73-1

UPPER KINGS RIVER BASIN

LICENSEE: Atmospherics Incorporated

CLIENT: Kings River Conservation District

TARGET AREA: Upper Kings River Basin

PURPOSE: To increase the water supply behind Pine Flat Dam by increasing precipitation.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators burned a solution of silver iodide and ammonium iodide in acetone; pyrotechnics used occasionally to give a silver iodide smoke; aircraft operations released silver iodide smoke by use of pyrotechnic devices.

Generator No.	Location	Elev.	Hours of Operation 1972 Oct.	Nov.	Dec.	1973 Jan.	Feb.	Mar.	Apr.	Total
1	Wishon Dam #1	7000	0	0	7.4	18.3	0	13.0	0	38.7
2	Wishon Dam #2	7000	0	0	0	0	0	0	0	0
3	Trimmer #1	1250	0	0	0	0	0	0	0	0
4	Trimmer #2	1250	0	0	0	0	0	0	0	0
5	Balch Camp #1	1300	0	23.7	7.4	18.3	16.3	24.3	5.1	95.1
6	Balch Camp #2	1300	0	0	0	0	0	0	0	0
7	Hackett Ranch	500	0	48.7	4.0	9.3	74.9	22.2	0	159.1
8	Millview	1900	0	73.6	0	101.9	69.7	0	0	245.2
9	Sierra Inn	2320	0	65.0	4.0	6.8	63.3	23.9	0	163.0
10	Heliport	4500	0	60.0	0	102.1	55.2	0	0	217.3
11	Sequoia Lake	5600	0	60.5	0	102.6	55.7	0	0	218.8
12	Cherry Gap	6800	0	59.9	0	102.9	37.6	0	0	200.4
13	Quail Flat	6900	0	0	0	0	0	0	0	0
14	Kings Canyon Overlook	7100	0	0	0	0	0	0	0	0
15	Pinehurst	4100	0	40.1	4.8	42.8	48.0	22.2	0	157.9
16	Badger	3000	0	20.1	0	16.7	70.9	26.1	0	133.8
17	Sierra Glen	3100	0	25.0	13.2	13.3	0	0	0	51.5
18	Radar	400	0	0	0	12.5	0	0	0	12.5
19	Reedley	700	0	47.1	16.2	13.3	29.2	16.4	0	122.2
20	Orange Grove	500	0	45.5	12.7	24.5	57.3	12.4	0	152.4
	Total		**0**	**569.2**	**69.7**	**585.3**	**578.1**	**160.5**	**5.1**	**1967.9**
	Aircraft		2.7	13.5	2.7	7.3	4.8	3.5	1.0	35.5
	Air and Surface Total		**2.7**	**582.7**	**72.4**	**592.6**	**582.9**	**164.0**	**6.1**	**2003.4**
Total AgI Used (grams)			260	9736	1297	9534	9299	2687	221	33034
Rate of dispersal										
Surface - 15 grams per hour										
Aircraft - 1 to 16 grams per minute										
Number of Storms			5	6	3	7	7	7	1	36
Number of days Seeded			5	11	4	14	16	10	1	61

Project 22-73-1

UPPER SANTA ANA RIVER WATERSHED

LICENSEE: San Bernardino Valley Municipal Water District

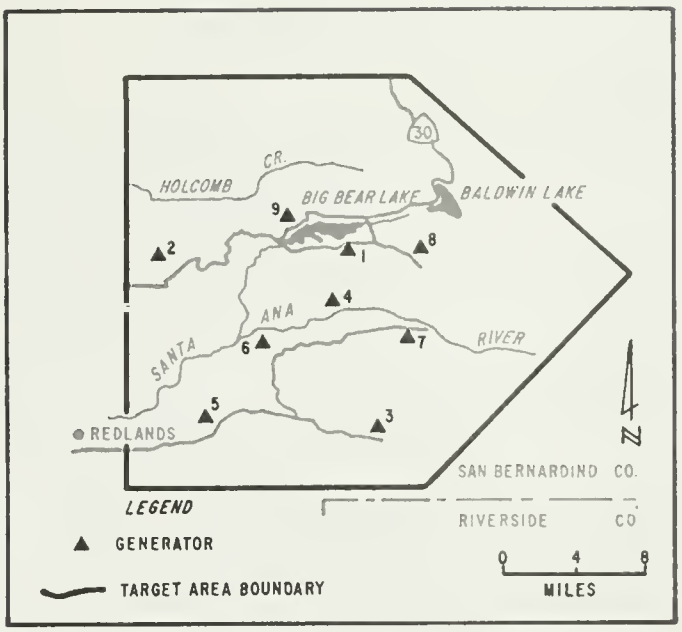
CLIENT: Same

TARGET AREA: Upper Santa Ana River Watershed

PURPOSE: To increase water for municipal and recreational use by increasing precipitation.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators burning a solution of silver iodide and sodium iodide in acetone solution.



Generator		Hours of Operation				
		1972		1973		
No.	Location	Nov.	Dec.	Jan.	Feb.	Total
1	Big Bear Lake	24:00	24:00	24:00	24:00	96:00
2	Green Valley Lake	24:00	24:00	15:00	24:00	87:00
3	Forest Falls	36:00	24:00	17:15	24:00	101:15
4	Seven Oaks	12:00	36:00	15:45	24:00	87:45
5	Mentone	36:00	36:00	15:00	24:00	111:00
6	Angelus Oaks	36:00	24:00	15:00	24:00	99:00
7	Camp Tahquitz	0	36:00	15:00	24:00	75:00
8	Sugar Loaf	24:00	48:30	15:00	24:00	111:30
9	Fawnskin	1:30	36:00	0	24:00	61:30
	Total	**193:50**	**288:50**	**132:00**	**216:00**	**830:00**
No. of Storms		2	2	1	1	6
No. of Days Seeded		3	4	2	2	11
AgI used (grams)		5805	8655	3960	6480	24,900
Rate of Dispersal 30 grams per hour						

Project 23-73-1

LAKE ALMANOR

LICENSEE: Pacific Gas and Electric Company

CLIENT: Same

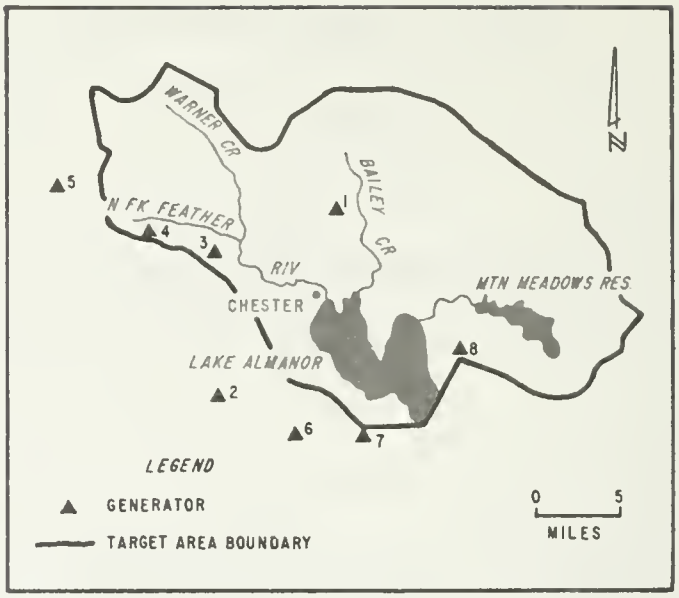
TARGET AREA: Drainage basin of Lake Almanor, Butt Valley, and Mountain Meadows Reservoir within the drainage basin of the North Fork of the Feather River.

PURPOSE: To increase the water supply for power production by increasing precipitation which occurs as snow, and to determine the effectiveness of cloud seeding.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: High-elevation, radio-controlled ground generators burning a solution of silver iodide and sodium iodide in acetone.*

*Generator operation was grouped as south and west. The south group was initially randomized during "cold southerly" storms. If seeding did occur, it occurred during the first 11 hours. No seeding took place in the 12th hour. Then the chance decision on the next 12-hour period was made. Randomization was based on the overall expectation that 50 percent of the 12-hour periods would be seeded and 50 percent would not. Later, because of a dry season throughout California, the southerly storms were not randomized. The west generator group operated for the "cold westerly" storms and randomization was not part of this operation. The total hours of operation varied between generators within a group because certain of them were not always operable.



Generator			Hours of Operation							
			1972		1973					
No.	Location	Elev.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
	South Group									
2	Butt Mountain	6100	33:00	6:00	51:04	86:41	48:32	0	0	225:17
3	Stover Mountain	6000	66:00	0	0	86:41	11:30	0	0	164:11
4	Feather River	5444	1100	16:50	40:04	86:41	48:32	11:00	0	214:07
6	Keefer Ridge	5000	55:00	16:50	22:00	86:41	48:32	11:00	0	240:03
7	Ohio Ridge	6100	66:00	16:50	51:04	86:41	48:32	11:00	0	280:07
8	Dyer Mountain	7450	66:00	16:50	51:04	86:41	48:32	11:00	0	280:07
	Subtotal		**297:00**	**73:20**	**215:16**	**520:06**	**254:10**	**44:00**	**0**	**1403:52**
	West Group									
1	Mud Creek Butte	6100	11:00	82:28	92:58	0	68:22	0	22:00	276:48
2	Butt Mountain	6100	11:00	44:07	92:58	0	68:22	0	0	216:27
3	Stover Mountain	6000	33:07	0	0	0	53:00	0	22:00	108:07
4	Feather River	5444	33:07	82:28	83:20	0	68:22	0	22:00	289:17
5	Christie Hill	6700	33:07	66:02	92:58	0	53:00	0	22:00	267:07
6	Keefer Ridge	5000	22:07	82:28	38:23	0	68:22	0	22:00	233:20
	Subtotal		**143:28**	**357:33**	**400:37**	**0**	**379:28**	**0**	**110:00**	**1391:06**
South and West Total			**440:28**	**430:53**	**615:53**	**520:06**	**633:38**	**44:00**	**110:00**	**2794:58**
Total AgI Used (grams) Rate of Dispersal 25 grams per hour			11011.7	10772.1	15397.0	13002.5	15840.9	1100.0	2750.0	69874.2
Days seeded			10	12	13	11	12	1	2	61

Project 26-73-1

SANTA CLARA COUNTY PROJECT

LICENSEE: Santa Clara County Flood Control and Water District

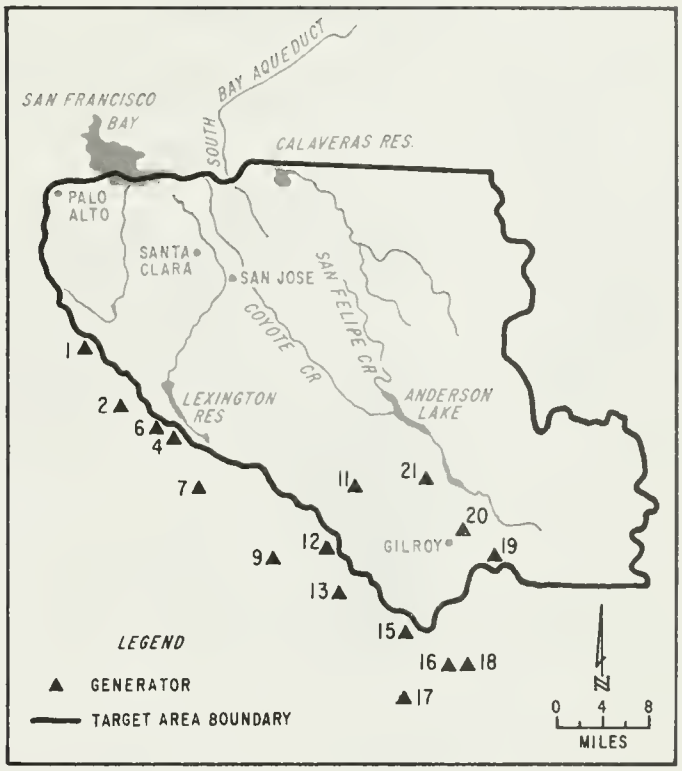
CLIENT: Same

TARGET AREA: Santa Clara County

PURPOSE: To increase precipitation and water supply behind district reservoirs.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Modified starfire ground generators burning an acetone solution of silver iodide and sodium iodide in acetone.



Generator No.	Location	Hours of Operation 1972 Nov.	Dec.	1973 Jan.	Feb.	Mar.	Total
1	Saratoga Gap, Los Gatos	2:00	0	16:45	0	0	18:45
2	Skyline Blvd, Los Gatos	1:20	0	16:45	0	0	18:05
4	Sunset Dr., Los Gatos	2:00	0	19:30	13:15	0	34:45
6	Hwy 17, Glenwood	2:00	0	33:10	8:20	0	43:30
7	Old Soquel Rd., Santa Cruz	2:05	0	32:00	22:25	0	56:30
9	Corralitos Rd., Corralitos	0	0	34:40	18:15	0	52:55
11	Spring Valley Rd., Morgan Hill	2:35	0	33:20	32:20	9:10	77:25
12	Bella Vista Ln., Watsonville	2:25	0	22:20	20:10	0	44:55
13	Carlton Dr., Watsonville	0	0	20:30	8:15	0	28:45
15	Payne Rd., San Juan Bautista	0	0	9:35	21:20	0	30:55
16	Hwy 156, Hollister	0	0	0	7:20	0	7:20
17	San Juan Rd., Salinas	0	0	0	7:10	0	7:10
18	Duncan Rd., San Juan Bautista	0	0	0	11:05	0	11:05
19	Pacheco Pass Rd., Hollister	0	0	0	40:15	7:45	48:00
20	Dryden Ave., Gilroy	0	0	10:45	40:10	11:45	62:40
21	East San Martin., San Martin	1:55	0	10:45	35:55	7:25	56:00
	Total	**16:20**	**0**	**260:05**	**286:15**	**36:05**	**598:45**
	No. of Storms Seeded	1	0	5	7	2	15
	No. of Days Seeded	1	0	4	8	2	15
	AgI Used (grams) Dispersal Rate - 25 grams per hour	408	0	6502	7156	902	14968

Project 30-73-1

CENTRAL SIERRA RESEARCH

LICENSEE: Fresno State College Foundation, Atmospheric Water Resources Research

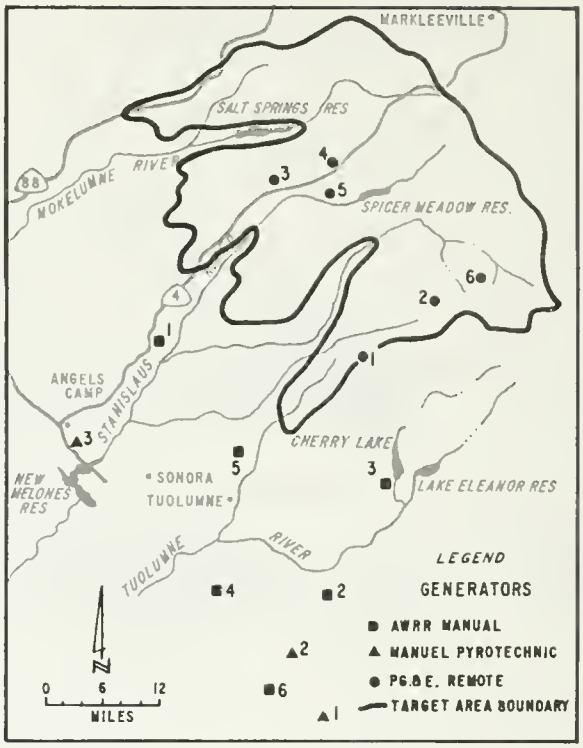
CLIENT: Same

TARGET AREA: Watersheds of the Stanislaus and Mokelumne Rivers above a 5,000-foot elevation.

PURPOSE: Experimental weather modification for precipitation increase. (Program received continuing financial support of U.S. Bureau of Reclamation and service assistance from various other organizations.)

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Surface, fixed, and mobile actetone and pyrotechnic generators.



Generator	No.	Location	Elev.	1972 Nov.	1972 Dec.	1973 Jan.	1973 Feb.	Total
Remote Generators (P.G.& E.)	1.	Dodge Ridge	7360	122:30	31:00	15:45	14:00	189:15
	2.	Hammil Ridge	8480	31:30		24:15	7:00	62:45
	3.	Mattley Meadow	7840	22:00	51:00	15:15		88:15
	4.	Mt. Reba	7680		12:30	4:00		16:30
	5.	Sapps Hill	7300	22:00	27:00	22:45		71:45
	6.	Bennett Juniper	8320				7:00	7:00
(AgI dispersed at rate of 30 grams/hour)								
Manual Generators	1.	Hunter Dam	3200			13:00		13:00
	2.	Buck Meadows	3010	7:00	5:00	10:30	19:00	41:30
	3.	Cherry Valley Dam	4710	6:45	21:30	17:00	19:00	64:15
	4.	Groveland	3200		10:45	9:30	8:00	28:15
	5.	Twain Harte	3600		9:00	9:30		18:30
	6.	Buckhorn Peak	3450		5:00	3:00		8:00
(AgI dispersed at rate of 22 and 43 grams/hour)								
Mobile Generators (Area of use not shown on map)	1.	Avery			14:15			14:15
	2.	College Springs			3:00			3:00
	3.	Long Barn				7:30		7:30
	4.	Yankee Hill				1:30		1:30
	5.	Wilseyville				4:30		4:30
(AgI dispersed at rate of 22 grams/hour)								
Manual Pyrotechnic	1.	Mariposa	2100	3:00	2:00			5:00
	2.	Apple Glen	3280		6:00		3:00	9:00
	3.	Angels Camp	1530					
(flares ignited at 8 min. intervals) (AgI dispersed at rate of 20 grams/flare)								
Total Hours				214:45	204:00	158:00	77:00	653:45
AgI Used (grams)				7011	6663	4131	2332	20137
Number of storms seeded				2	6	3	2	13
Number of days seeded				9	11	5	3	28

Project 32-73-1

LAKE TAHOE AND TRUCKEE RIVER BASIN

LICENSEE: Desert Research Institute

CLIENT: Division of Atmospheric Water Resources Management, U.S. Bureau of Reclamation

TARGET AREA: Lake Tahoe and Truckee River Watersheds

PURPOSE: Precipitation management research to increase inflow to Pyramid Lake.

ACTIVE AGENT: Silver iodide

DISPERSAL METHOD: Ground-based generators:

Generators 1 and 2, NAWC generator type (radio-controlled), burned a solution of silver iodide and ammonium iodide in acetone.

Generators 3 and 4, DRI-WM generator type (radio-controlled), burned a solution of silver iodide and ammonium iodide in acetone.

Generators 5 and 6, USBR II generator type (radio-controlled), burned a solution of silver iodide and isopropylamine in kerosene.

Generator			Hours of Operation							
			1972			1973				
No.	Location	Elev.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1	Bunker Hill	7524	14.0	11.3	14.6	49.9	17.1	40.1	0	147.0
2	Duncan Peak	7182	18.0	39.8	18.1	64.9	0	0	0	140.8
3	Baker Pass	7800	0	76.5	9.0	0	4.2	0	0	89.7
4	Norden	7100	0	0	0	0	50.0	55.4	.4	105.8
5	Cisco Butte	6400	18.8	86.9	31.0	59.0	78.2	37.4	8.4	319.7
6	Blue Canyon	5300	11.8	83.2	31.0	89.5	74.4	58.6	14.5	363.0
	Total Hours		**62.6**	**297.7**	**103.7**	**263.3**	**223.9**	**191.5**	**23.3**	**1166.0**
AgI Used (grams) (AgI dispersed at rate of 22.5 and 42.6 grams per hour)			2024	10117	3579	8909	8105	6238	985	39959
Number of Storms Seeded			2	6	1	5	2	4	1	21
Number of Days Seeded			2	8	2	6	3	6	1	28

Project 34-73-1

UPPER AMERICAN RIVER

LICENSEE: Sacramento Municipal Utility District

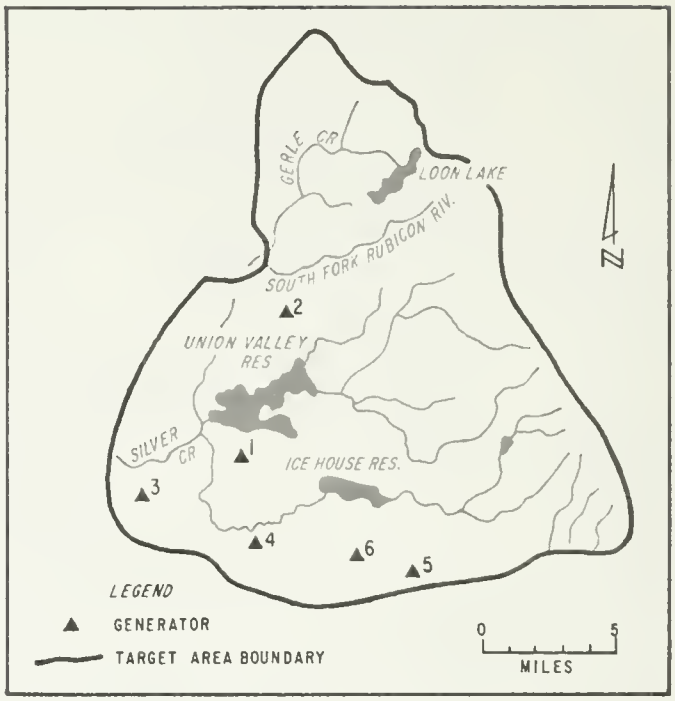
CLIENT: Same

TARGET AREA: Upper American River Basin in eastern El Dorado County, north of U.S. Highway 50.

PURPOSE: To increase water supply by increasing precipitation in the form of snow.

ACTIVE AGENT: Silver iodide (AgI)

DISPERSAL METHOD: Ground-based generators burning a solution of silver iodide and ammonium iodide in acetone.



Generator No.	Location	Elev.	Hours of Operation 1972 Nov.	Dec.	1973 Jan.	Feb.	Mar.	Apr.	May	Total
1	Big Hill	6125	72:20	42:35	102:50	89:55	60:35	0	8:05	376:20
2	Robbs Saddle	5725	38:05	49:20	96:00	95:30	68:45	0	8:15	355:55
3	West Peavine	5020	18:30	47:30	97:15	92:20	72:45	0	8:10	336:30
4	Log Deck	5225	67:45	46:55	91:50	93:50	72:05	0	6:45	379:10
5	Kyburz	3975	14:10	49:55	93:10	95:15	71:30	0	4:45	328:45
6	Granite Spring	5750	65:20	28:00	86:40	90:25	69:40	0	6:40	346:45
	Total		**276:10**	**264:15**	**567:45**	**557:15**	**415:20**	**0**	**42:40**	**2123:25**
AgI Used (grams)			6903	6606	14189	13930	10382	0	1067	53077
(AgI dispersed at rate of 25 grams/hour)			3	3	4	3	5	0	1	19
Number of storms seeded			6	5	9	7	8	0	1	36
Number of days seeded										

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California. Dept. of Water Resources.
Weather modification operations in California.
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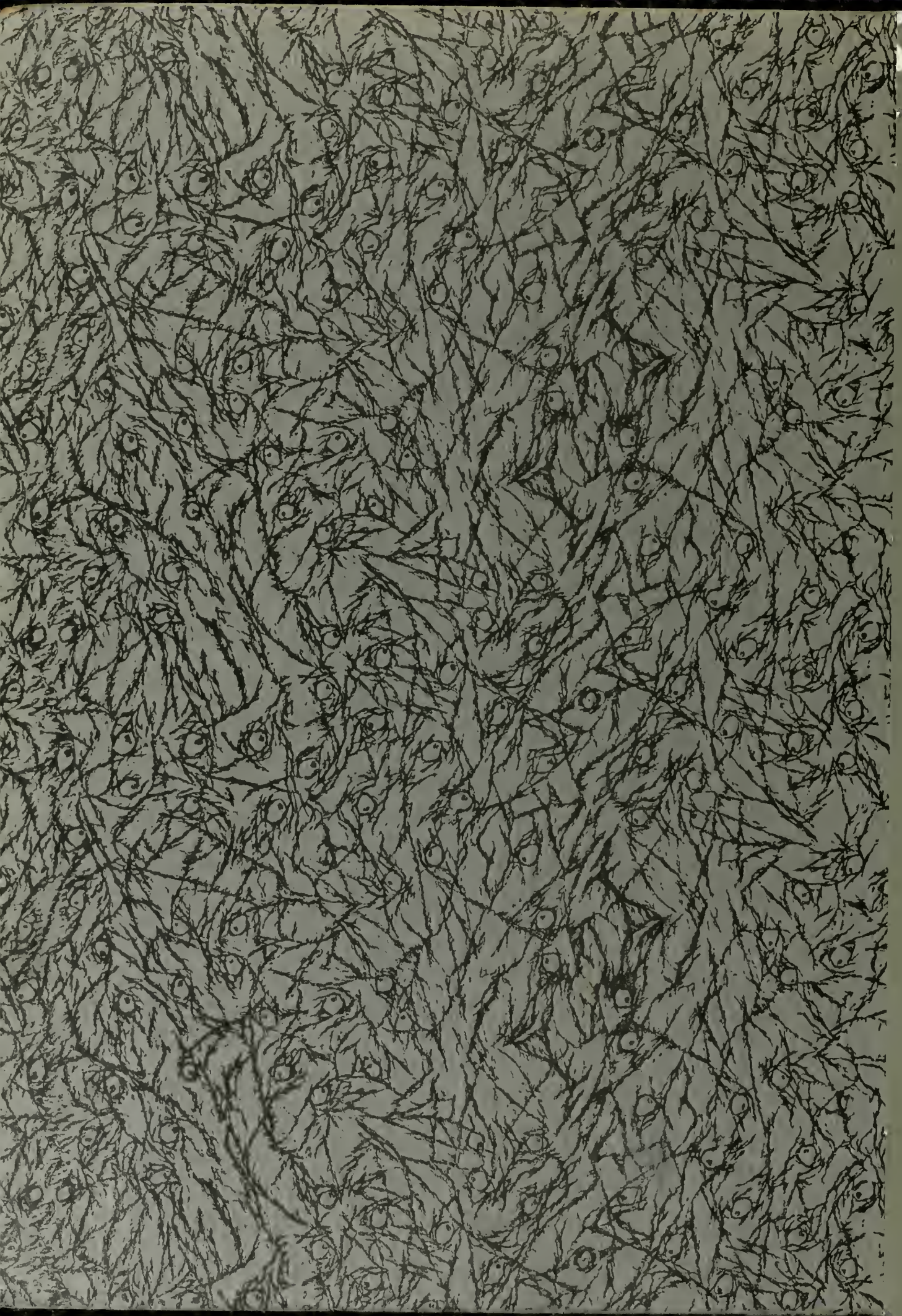
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